CLAIMS

1. A method of operating a data communication network having at least one client server and a plurality of recipient servers wherein the client servers and recipient servers exchange data packets, each of the recipient servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the method comprising the steps of:

providing a data packet configured to include a first data segment indicating a destination port number;

providing a load balancer configured for effecting transfer of data packets between the client server and recipient servers, the load balancer being configured to examine the first data segment in the data packets to determine which of the recipient servers shall receive the data packet;

determining the destination port number in each first data segment;

determining whether the destination port number in each first data segment matches a service port number of one of the recipient servers or a redirect port number for a subset of the plurality of recipient servers;

forwarding the data packet to the recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for that particular recipient server;

selecting a recipient server from a subset of recipient servers that has a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for the subset of recipient servers;

forwarding the data packet to the selected recipient server;

configuring a data packet as a reply to the data packet received by the selected server from the client server to include a second data segment that indicates a service port number to which the client server shall direct all subsequent data packets;

thereafter forwarding the configured data packet back to the client server;

reconfiguring the configured data packet received by the client server to indicate a destination port number that matches the service port number defined in the second data segment; and

forwarding the reconfigured data packet to a recipient server that services the service port number defined in the fourth data segment.

2. The method according to claim 1 further comprising the steps of:

designating one of the recipient servers as a default server if it is determined that the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers; and

forwarding the data packet to the recipient server that is designated as the default server if the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

3. A method of operating a data communication network having at least one client server and a plurality of recipient servers wherein the client servers and recipient servers exchange data packets, each of the recipient servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the

method comprising the steps of:

providing a data packet configured to include a first data segment indicating a destination port number, a second data segment indicating whether the client server is configured to provide port redirection, and a third data segment that enables the recipient servers to acknowledge that the client server is configured to provide port redirection and to indicate to the client server that the recipient server supports port redirection;

providing a load balancer configured for effecting transfer of data packets between the client server and recipient servers, the load balancer being configured to examine the data segments in the data packets to determine which of the recipient servers shall receive the data packet;

determining the destination port number in each first data segment;

determining whether the destination port number in each first data segment matches a service port number of one of the recipient servers or a redirect port number for a subset of recipient servers;

forwarding the data packet to the recipient server that has a service port number that matches the

destination port number in the data packet if the destination port number is determined to be a service port number for that particular recipient server;

selecting a recipient server from a subset of the plurality of recipient servers that has a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for the subset of recipient servers and if the second data segment indicates that the client server supports port redirection;

forwarding the data packet to the selected server if the second data segment indicates that the client server supports port redirection;

configuring a data packet as a reply to the data packet received by the selected server from the client to indicate that the recipient server acknowledges that the client server supports port redirection and that the recipient server supports port redirection, and to include a forth data segment that indicates a service port number to which the client server shall direct all subsequent data packets;

thereafter forwarding the configured data packet back to the client server;

reconfiguring the configured data packet received by the client server to indicate a destination port number that matches the service port number defined in the fourth data segment; and

forwarding the reconfigured data packet to a recipient server that services the service port number defined in the fourth data segment.

4. The method according to claim 3 wherein the second data segment comprises a flag that, when set, indicates that the client server supports port redirection, and when not set, indicates the client server does not support port redirection.

5. The method according to claim 4 wherein the third data segment comprises a flag that, when set, indicates the recipient server acknowledges that the client server supports port redirection and the recipient server supports port redirection, and when not set, indicates the recipient server acknowledges that the client server does not support port redirection and/or the recipient server does not support port redirection.

6. The method according to claim 3 the method further includes the steps of:

designating one of the recipient servers as a default server if it is determined that the second data segment indicates that the client server does not support port redirection; and

forwarding the data packet to the recipient server that is designated as the default server if the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

7. The method according to claim 3 wherein the load balancer is programmable and the step of providing the load balancer further includes the step of programming the load balancer with (i) the service and redirect port numbers of the plurality of recipient servers, and (ii) destination port numbers that correspond to the service port numbers.

8. The method according to claim 7 wherein the load balancer includes a plurality of external connectors wherein each external connector is connected to a corresponding recipient server, the method further

comprising the step of assigning destination port numbers to the external connectors.

9. A data communication network comprising:

at least one client server;

a plurality of recipient servers, each of said recipient servers having at least one unique service port number and at least one redirect port number wherein a subset of the recipient servers shares the same redirect port number;

means for providing a data packet configured to include a first data segment indicating a destination port number;

a load balancer in data communication with said client server and said recipient servers, said load balancer being configured to examine the first data segments in the data packet to determine which of said recipient servers shall receive the data packet;

said load balancer being configured to determine the destination port number in each first data segment;

said load balancer being configured to determine whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for

a subset of said recipient servers;

said load balancer being configured to forward the data packet to said recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for said server;

said load balancer being configured to select a recipient server from a subset of said recipient servers that have a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for said set of said recipient servers;

said load balancer being configured to forward the data packet to the selected server;

means for configuring a data packet as a reply to the data packet received by said selected server from the client to include a forth data segment that indicates a service port number to which said client server shall direct all subsequent data packets;

means for forwarding the configured data packet to said load balancer;

said load balancer being configured to forward the configured data packet back to said client server;

means for reconfiguring the configured data packet received by said client server to indicate a destination port number that matches the service port number defined in the second data segment;

means for forwarding the reconfigured data packet to said load balancer; and

said load balancer being configured to forward the reconfigured data packet to a recipient server that services the service port number defined in the second data segment.

10. A data communication network comprising:

at least one client server;

a plurality of recipient servers, each of said recipient servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number;

means for providing a data packet configured to include a first data segment indicating a destination port number, a second data segment indicating whether the client server is configured to provide port redirection, and a third data segment that enables the recipient servers to acknowledge that the client

server is configured to provide port redirection and to indicate to the client that the recipient server supports port redirection;

a load balancer in data communication with said client server and said recipient servers, said load balancer being configured to examine the data segments in the data packet to determine which of said recipient servers shall receive the data packet;

said load balancer being configured to determine the destination port number in each first data segment;

said load balancer being configured to determine whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for a subset of said recipient servers;

said load balancer being configured to forward the data packet to a particular recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for that particular server;

said load balancer being configured to select a recipient server from a set of said recipient servers that has a redirect port number that matches the

destination port number if the destination port number is determined to be a service port number for said set of recipient servers and if the second data segment indicates that said client server supports port redirection;

said load balancer being configured to forward the data packet to the selected server if the second data segment indicates that said client server supports port redirection;

means for configuring a data packet as a reply to the data packet received by said selected server from the client to indicate that the recipient server acknowledges that said client server supports port redirection and that the recipient server supports port redirection, and to include a forth data segment that indicates a service port number to which said client server shall direct all subsequent data packets;

means for forwarding the configured data packet to said load balancer;

said load balancer being configured to forward the configured data packet back to said client server;

means for reconfiguring the configured data packet received by said client server to indicate a

destination port number that matches the service port number defined in the forth data segment;

means for forwarding the reconfigured data packet to said load balancer; and

said load balancer being configured to forward the reconfigured data packet to a recipient server that services the service port number defined in the fourth data segment.

11. The data communication network according to claim 10 wherein the second data segment comprises a flag that, when set, indicates that the client server supports port redirection and when not set, indicates that the client server does not support port redirection.

12. The data communication network to claim 11 wherein the third data segment comprises a flag, when set, indicates the recipient server acknowledges that the client server supports port redirection and the recipient server supports port redirection and when not set, indicates the recipient server acknowledges that the client server does not support port redirection and/or the recipient server does not support port redirection.

13. The data communication network according to claim 10 wherein the load balancer further comprises:

means for designating one of the recipient servers as a default server if the determining means determines that the second data segment indicates that the client server does not support port redirection; and

means for forwarding the data packet to the recipient server that is designated as the default server if the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

14. The data communication network according to claim 13 wherein the load balancer is programmable and the load balancer further comprises means for programming the load balancer with the service and redirect port numbers of the recipient servers, and destination port numbers that correspond to the service port numbers.

15. A load balancer for effecting data communication between at least one client server and a plurality least two recipient servers wherein each of the recipient

servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the load balancer comprising:

means for receiving data packets configured to include a first data segment indicating a destination port number;

means for examining the first data segments in the data packet to the destination port number in each first data segment;

means for determining whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for a subset of said recipient servers;

means for forwarding the data packet to a particular recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for that particular server;

means for selecting a recipient server from a subset of the plurality of recipient servers that has a redirect port number that matches the destination

port number if the destination port number is determined to be a service port number for said set of recipient servers;

means for forwarding the data packet to the selected server;

means for processing data packets responsively sent by the selected server to determine if the data packets sent by the selected server includes a second data segment that indicates a service port number to which the client server shall direct all subsequent data packets;

means for forwarding the processed data packets to the client server;

means for processing data packets responsively sent by the client server to determine if the data packet includes a destination port number that matches the service port number defined in the second data segment; and

means for forwarding the data packet received from the client server to a recipient server that services the service port number defined in the second data segment.

16. The data communication network according to claim 15 wherein the load balancer further comprises:

means for designating one of the recipient servers as a default server if the determining means determines that the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers; and

means for forwarding the data packet to the recipient server that is designated as the default server.

17. A load balancer for effecting data communication between at least one client server and at least two recipient servers wherein each of the recipient servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the load balancer comprising:

means for receiving data packets configured to include a first data segment indicating a destination port number, a second data segment indicating whether the client server is configured to provide port redirection, and a third data segment that enables the recipient servers to acknowledge that the client

server is configured to provide port redirection;

means for examining the data segments in the data packet to the destination port number in each first data segment;

means for determining whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for a subset of said recipient servers;

means for forwarding the data packet to a recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for said server;

means for selecting a recipient server from a subset of said recipient servers that has a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for said subset of recipient servers and if the second data segment indicates that said client server supports port redirection;

means for forwarding the data packet to the selected server if the second data segment indicates that said client server supports port redirection;

means for processing data packets responsively sent by the selected server to determine if the recipient server acknowledges that the client server supports port redirection and that the recipient server supports port redirection, and to determine if the data packets sent by the selected server includes a forth data segment that indicates a service port number to which the client server shall direct all subsequent data packets;

means for forwarding the processed data packets to the client server;

means for processing data packets responsively sent by the client server to determine if the data packet includes a destination port number that matches the service port number defined in the forth data segment; and

means for forwarding the data packet received from the client server to a recipient server that services the service port number defined in the fourth data segment.

18. The load balancer according to claim 17 wherein the load balancer further comprises:

means for designating one of the recipient servers as a default server if the determining means determines that the second data segment indicates that the client server does not support port redirection; and

means for forwarding the data packet to the recipient server that is designated as the default server if the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

19. The load balancer according to claim 18 wherein the load balancer is configured to be programmable and the load balancer further comprises means for programming the load balancer with the service and redirect port numbers of the recipient servers.

20. A load balancing method for effecting data communication between at least one client server and a plurality of recipient servers wherein each of the recipient servers having at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the load balancing method comprising:

receiving data packets configured to include a first data segment indicating a destination port number;

examining the data segments in the data packet to the destination port number in each first data segment;

determining whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for a subset of said recipient servers;

forwarding the data packet to a recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for that particular recipient server;

selecting a recipient server from a subset of the plurality of recipient servers that has a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for said subset of recipient servers;

forwarding the data packet to the selected recipient server;

processing data packets responsively sent by the selected server to determine if the data packets sent by the selected server includes a second data segment

that indicates a service port number to which the client server shall direct all subsequent data packets;

forwarding the processed data packets to the client server;

processing data packets responsively sent by the client server to determine if the data packet includes a destination port number that matches the service port number defined in the forth data segment; and

forwarding the data packet received from the client server to a recipient server that services the service port number defined in the second data segment.

21. The load balancing method according to claim 20 further comprises:

designating one of the recipient servers as a default server if the determining means determines that the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers; and

forwarding the data packet to the recipient server that is designated as the default server if the first data

segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

22. A data packet configured for use in a data communication network having at least one client server and a plurality of recipient servers, the data packet comprising a data segment indicating a destination port number.

23. The data packet according to claim 22 further comprising a second data segment that indicates a service port number to which the client server shall redirect subsequent data packets.

24. A load balancing method for effecting data communication between at least one client server and at least two recipient servers wherein each of the recipient servers has at least one unique service port number and at least one redirect port number wherein more than one recipient server shares the same redirect port number, the load balancing method comprising the steps of:

receiving data packets configured to include a first data segment indicating a destination port number, a

second data segment indicating whether the client server is configured to provide port redirection, and a third data segment that enables the recipient servers to acknowledge that the client server is configured to provide port redirection;

examining the data segments in the data packet to the destination port number in each first data segment;

determining whether the destination port number in each first data segment matches a service port number of one of said recipient servers or a redirect port number for a subset of said recipient servers;

forwarding the data packet to said recipient server that has a service port number that matches the destination port number in the data packet if the destination port number is determined to be a service port number for said server;

selecting a recipient server from a subset of said recipient servers that has a redirect port number that matches the destination port number if the destination port number is determined to be a service port number for said set of recipient servers and if the second data segment indicates that said client server supports port redirection;

forwarding the data packet to the selected server if the second data segment indicates that said client server supports port redirection;

processing data packets responsively sent by the selected server to determine if the recipient server acknowledges that the client server supports port redirection and that the recipient server supports port redirection, and to determine if the data packets sent by the selected server includes a forth data segment that indicates a service port number to which the client server shall direct all subsequent data packets;

forwarding the processed data packets to the client server;

processing data packets responsively sent by the client server to determine if the data packet includes a destination port number that matches the service port number defined in the forth data segment; and

forwarding the data packet received from the client server to a recipient server that services the service port number defined in the fourth data segment.

25. The load balancing method according to claim 24 further comprises:

designating one of the recipient servers as a default server if the determining means determines that the second data segment indicates that the client server does not support port redirection; and

forwarding the data packet to the recipient server that is designated as the default server if the first data segment defines a destination port number that does not match any of the service port numbers and redirect port numbers of the recipient servers.

26. A data packet configured for use in a data communication network having at least one client server and a plurality of recipient servers, the data packet comprising:

a first data segment indicating a destination port number;

a second data segment indicating whether the client server is configured to provide port redirection; and

a third data segment that enables the recipient servers to acknowledge that the client server is configured to provide port redirection.

27. The data packet according to claim 24 further comprising a fourth data segment that indicates a service port number to which the client server shall redirect subsequent data packets.